

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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CARL ZEISS SMT GMBH  
Petitioner

v.

NIKON CORPORATION  
Patent Owner

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Case IPR2013-00363  
Patent 7,348,575 B2

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Before HOWARD B. BLANKENSHIP, SALLY C. MEDLEY, and  
MATTHEW R. CLEMENTS, *Administrative Patent Judges*.

CLEMENTS, *Administrative Patent Judge*.

DECISION  
Institution of *Inter Partes* Review  
37 C.F.R. § 42.108

## I. INTRODUCTION

Carl Zeiss SMT GmbH (“Carl Zeiss”) filed a petition requesting *inter partes* review of claims 55–67 of U.S. Patent No. 7,348,575 B2 (Ex. 1101, “the ’575 patent”). Paper 3 (“Pet.”). The patent owner, Nikon Corporation (“Nikon”), did not file a preliminary response. We have jurisdiction under 35 U.S.C. § 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides as follows:

**THRESHOLD.**—The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Upon consideration of the petition, we determine that the information presented by Carl Zeiss establishes that there is a reasonable likelihood that Carl Zeiss would prevail in showing unpatentability of claims 55–67 of the ’575 patent. Accordingly, pursuant to 35 U.S.C. § 314, we institute an *inter partes* review for claims 55–67 of the ’575 patent.

### A. Related Proceedings

Seven applications claim benefit under 35 U.S.C. § 120 to the application that issued as the ’575 patent: 11/513,160 (pending); 11/583,934 (issued as U.S. Patent No. 7,309,870 ); 11/583,916 (issued as U.S. Patent No. 7,312,463 ); 11/882,208 (abandoned); 12/379,415 (pending); 12/884,332 (abandoned); and 13/275,760 (pending). Pet. 1-2. United States Patent No. 7,309,870 has been the subject of four interference proceedings. *Id.* Carl Zeiss also has filed another

petition for *inter partes* review of claims 1–3, 8–12, 16–20, 23–26, and 29–33 of the '575 patent: IPR2013-00362. In addition to these identified related proceedings, Nikon indicates that U.S. Patent Application No. 13/889,780 may affect, or may be affected by, a decision in this *inter partes* review. Paper 6.

### *B. The '575 Patent*

The subject matter of the '575 patent “relates to a catadioptric projection optical system, exposure apparatus, and exposure method and, more particularly, to a high-resolution catadioptric projection optical system suitable for use in production of semiconductor devices [and] liquid-crystal display devices by ... photolithography.” Ex. 1101, col. 1, ll. 18–23. In the production of semiconductor devices, photolithography uses a projection exposure apparatus to project “an image of a mask (or reticle) through a projection optical system onto a wafer (or a glass plate or the like) coated with a photoresist or the like.” Ex. 1101, col. 1, ll. 27–32. As the dimensions of semiconductor devices shrink, the projection optical system of the projection exposure apparatus requires greater resolving power (resolution). Ex. 1101, col. 1, ll. 32–36. In order to satisfy the requirements for the resolving power of the projection optical system, it is necessary to shorten the wavelength of illumination light (exposure light) and to increase the image-side numerical aperture of the projection optical system. Ex. 1101, col. 1, ll. 37–41. It was known to increase the numerical aperture by putting a medium with a high refractive index, like a liquid, in the optical path between the projection optical system and the image plane. Ex. 1101, col. 1, ll. 55–58. However, there were known disadvantages to this approach. Ex. 1101, col. 1, ll. 59–67.

The '575 patent discloses systems and methods to provide a relatively compact projection optical system that is “corrected for various aberrations, such as chromatic aberration and curvature of field, and is capable of securing a large effective image-side numerical aperture while suppressing the reflection loss on optical surfaces.” Ex. 1101, col. 2, ll. 3–9. An object of the embodiment is to achieve a large numerical aperture, without increase in the scale of optical members forming a catadioptric projection optical system. Ex. 1101, col. 2, ll. 30–32. In order to achieve that object, a projection optical system according to a third embodiment is a catadioptric projection optical system for forming an image of a first surface on a second surface, the projection optical system comprising four units. Ex. 1101, col. 3, ll. 8–27; *see also id.* at col. 11, l. 48 to col. 13, l. 22. Figure 9 of the '575 patent is reproduced below:

**Fig.9**

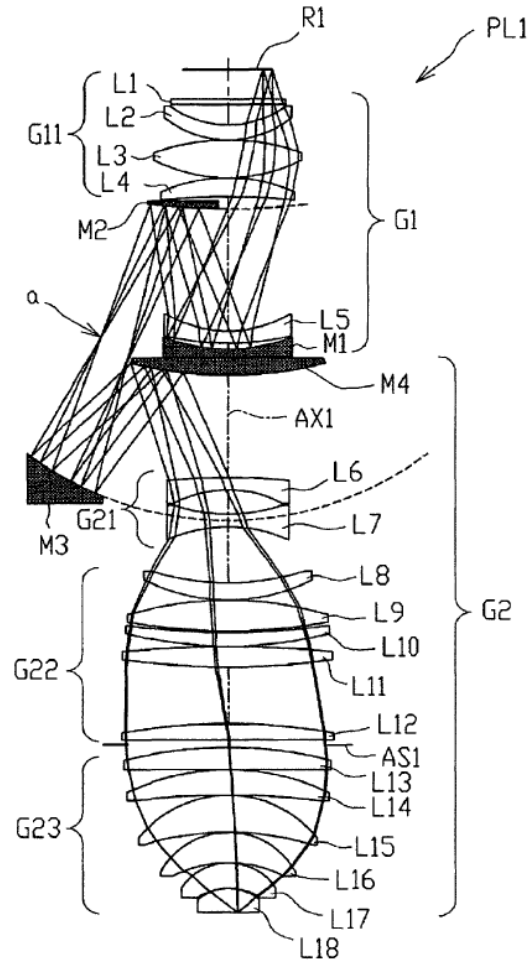


Figure 9 of the '575 patent depicts an embodiment of the catadioptric projection optical system with four lens units. Ex. 1101, col. 4, ll 31–33; col. 3, ll. 8–27. The lens unit G1 constitutes the first unit. Ex. 1101, col. 29, ll. 39–41. Negative meniscus lens L5, concave reflecting mirror M1, convex reflecting mirror M2, concave reflecting mirror M3, and convex reflecting mirror M4 constitute a second unit. Ex. 1101, col. 30, ll. 28–31. Lens unit G21 constitutes the third unit. Ex. 1101, col. 29, ll. 45–46. Lens unit G22, aperture stop AS1, and lens unit G23 constitute a fourth unit. Ex. 1101, col. 30, ll. 59–60.

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